



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/360,582	07/26/1999	BRANDON W. BLACKBURN	MIT-8312	4382

7590 04/25/2006

PATRICK J O'SHEA ESQ
SAMUELS GAUTHIER & STEVENS LLP
225 FRANKLIN STREET SUITE 3300
BOSTON, MA 02110

EXAMINER

MONDT, JOHANNES P

ART UNIT	PAPER NUMBER
----------	--------------

3663

DATE MAILED: 04/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/360,582

Applicant(s)

BLACKBURN, BRANDON W.

Examiner

Johannes P. Mondt

Art Unit

3663

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 October 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 4-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 4-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 July 1999 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/06/2005 has been entered.

Response to Amendment

Amendment filed 10/06/05 with aforementioned Request for Continued Examination under 37 C.F.R. 1.114 forms the basis for this office action. In said Amendment applicant amended the specification, cancelled claim 3 and substantially amended claims 1-2 and 4-8. Comments on Remarks submitted with said Amendment are included below under "Response to Arguments".

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5)

because they do not include the following reference signs jointly mentioned with reference to a single Figure in the description: in particular numerals 12 and 30 are not shown in relation to its other in a single Figure. Corrected drawing sheets

Art Unit: 3663

in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to under 37 CFR 1.83(b) because they are incomplete. 37 CFR 1.83(b) reads as follows:

When the invention consists of an improvement on an old machine the drawing must when possible exhibit, in one or more views, the improved portion itself, disconnected from the old structure, and also in another view, so much only of the old structure as will suffice to show the connection of the invention therewith.

In particular, a lack of any connection between reservoir 14 and check valve 28 implies that no circulation of coolant between reservoir 14, heat exchanger 24 and neutron source assembly 12 is shown.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement

sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

1. The amendment to the specification is objected to for reference to both elements 12 and 30 in the description of Figure 1 while only numeral 12 is shown in said Figure 1.
2. The specification is furthermore objected to for not disclosing the connection nor the topographic relation between the neutron source 12 and a portion thereof described by numeral 30 shown in Figure 2.

Claim Objections

1. **Claim 1** is objected to because of the following informalities: the wording "through by using a nozzle" (line 3) should be replaced by: "by using a nozzle". Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. ***Claims 1-2 and 4-8*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Eggers (5,392,319) (previously made of record) in view of Lidsky et al (5784423)(previously made of record) and Alger et al (4,141,224).

On claim 1: Eggers teaches (see title, abstract, and Figures 1, 10-11) a method of cooling a low Z target material of a neutron source assembly, comprising: providing flow of liquid coolant (light water and D₂O; col. 12, l. 51 – col.13, l. 68) to a low Z (col. 6, l. 13-58 and col. 7, l. 5-20) target material (target support region 116, on target carriage 26) (loc.cit.) to cool the low Z target material (loc.cit.).

Eggers does not necessarily teach said liquid gallium as liquid coolant. However, it would have been obvious to include the teaching of liquid gallium as coolant for an irradiation target in view of Lidsky et al (col. 7, l. 10-20) being at least suitable as equivalent to water (loc.cit.). It has been held that the selection of a particular material known in the art to be suitable for its intended purpose would be entirely obvious. In re Leshin 125 USPQ 416. Eggers further teaches the liquid coolant 134 (col. 9, l. 28) to be provided to a non-bombarded surface (inside surface of 116 within 26 rather than the outside surface bombarded by the ion beam 22 (see Figures 1, 10).

Art Unit: 3663

Although neither Eggers nor Lidsky et al necessarily teach the further limitation that liquid gallium be provided by a concentrated flow through a nozzle in a direction perpendicular to said non-bombarded surface, it would have been obvious to include said further limitation in view of Alger et al, who, in a patent on a cooling apparatus for an irradiation target (see title and abstract, and cols. 2-4), hence analogous art, teach to provide liquid coolant through, and by using, a nozzle 29 aimed in a direction normal to a non-bombarded surface (see Figures 1 and 2 in Alger et al) against the non-bombarded backside of the target 11 (again, see Figures 1 and 2), for the specifically stated purpose of increasing efficiency of cooling (col. 1, l. 19-23 and 44-66). Motivation to include the teaching by Alger et al in the combined invention by Eggers and Lidsky et al derives from the resultant increase in cooling efficiency as taught by Alger et al (loc.cit.).

On claim 2: Eggers teaches a reservoir (inherently existing as otherwise conduit 90 could not deliver said liquid coolant) (cf. col. 8, l. 24-29) (see Figures 1 and 10) while Eggers also teaches a heat exchanger 132 or 226 (col. 9, l. 23-35 and col. 13, l. 34) through which heat is removed from the liquid coolant, said liquid coolant, when adopting the teaching by Lidsky et al being liquid gallium as explained in the rejection of claim 1; also, the combined invention with cooling apparatus as taught by Alger et al comprises a liquid coolant reservoir 23 (col. 2, l. 23-24) while the liquid coolant is pumped from the reservoir (through 27, see col. 2, l. 24 and Figures 1 and 2) through the nozzle 29 (col. 2, l. 57-60) to the (in application to Eggers low Z) target material to cool the target material (see rejection of claim 1 above) and through a heat exchanger

Art Unit: 3663

28 (col. 2, l. 24-27) to remove heat from the liquid coolant (a cooling system necessarily effects the exchange of heat and hence is a heat exchanger).

On claim 4: the target material in Eggers comprises beryllium (col. 6, l. 48-51).

On claim 5: Eggers teaches a neutron source assembly 10 (title, abstract, col. 5, l. 40 – col. 6, l. 58) having a liquid cooled target (light water and D₂O; col. 12, l. 51 – col.13, l. 68), comprising: an accelerator based neutron source 16/26/116 (accelerator 16 (col. 7, l. 5-20), target carriage 26 and target 116 (col. 7, 5-20 and col. 8, l. 62-66) including a low Z material (such as boron or beryllium) (col. 6, l. 13-59) (namely: low Z target 116 on target carriage 26; see col. 7, l. 5-20 and col. 8, l. 62-66) that is bombarded by accelerated particles (through proton accelerator 16; see col. 6, l. 13-51) to produce a neutron flux (col. 6, l. 13-59); and a cooling system to circulate liquid coolant (light water and D₂O; see above) through said accelerator based neutron source (namely: through 16/26/116) to cool the low Z target material.

Eggers does not necessarily teach said liquid gallium as liquid coolant. However, it would have been obvious to include the teaching of liquid gallium as coolant for an irradiation target in view of Lidsky et al (col. 7, l. 10-20) being at least suitable as equivalent to water (loc.cit.). It has been held that the selection of a particular material known in the art to be suitable for its intended purpose would be entirely obvious. In re Leshin 125 USPQ 416. Eggers further teaches the liquid coolant 134 (col. 9, l. 28) to be provided to a non-bombarded surface (inside surface of 116 within 26 rather than the outside surface bombarded by the ion beam 22 (see Figures 1, 10).

Although neither Eggers nor Lidsky et al necessarily teach the further limitation that liquid gallium be provided through a concentrated flow through a nozzle in a direction perpendicular to said non-bombarded surface, it would have been obvious to include said further limitation in view of Alger et al, who, in a patent on a cooling apparatus for an irradiation target (see title and abstract, and cols. 2-4), hence analogous art, teach to provide liquid coolant through, and by using, a nozzle 29 aimed in a direction normal to a non-bombarded surface (see Figures 1 and 2 in Alger et al) against the non-bombarded backside of the target 11 (again, see Figures 1 and 2), for the specifically stated purpose of increasing efficiency of cooling (col. 1, l. 19-23 and 44-66).

Motivation to include the teaching by Alger et al in the combined invention by Eggers and Lidsky et al derives from the resultant increase in cooling efficiency as taught by Alger et al (loc.cit.).

*On claims 6-7: Eggers teaches a reservoir (inherently existing as otherwise conduit 90 could not deliver said liquid coolant) (cf. col. 8, l. 24-29) (see Figures 1 and 10) while Eggers also teaches a heat exchanger 132 or 226 in fluid connection with said reservoir of liquid coolant (col. 9, l. 23-35 and col. 13, l. 34) through which heat is removed from the liquid coolant, said liquid coolant, when adopting the teaching by Lidsky et al being liquid gallium as explained in the rejection of claim 5 (*prima facie* obviousness ensured, see case law reference there); also, the combined invention with cooling apparatus as taught by Alger et al comprises a liquid coolant reservoir 23 (col. 2, l. 23-24) while the liquid coolant is pumped from the reservoir (through 27, see col. 2,*

Art Unit: 3663

l. 24 and Figures 1 and 2) through the nozzle 29 (col. 2, l. 57-60) to the (in application to Eggers low Z) target material to cool the target material (see rejection of claim 1 above) and through a heat exchanger 28 (col. 2, l. 24-27) to remove heat from the liquid coolant (a cooling system necessarily effects the exchange of heat and hence is a heat exchanger)., as well as means for circulating said liquid coolant between said reservoir 23, said heat exchanger 28 and said accelerator based neutron source 11 in the form of pump 27 (thus meeting the additional limitation defined by claim 7) and nozzle 29 (col. 2, l. 24 and col. 2, l. 28-30). *Motivation* to include the teaching by Alger et al in the invention by Egger and Lidsky et al derives from the more efficient cooling through improved circulation as expressed by Alger et al (col. 1, l. 19-33 and 45-65) as is also generally known in the art of cooling apparatus as conventional.

On claim 8: Eggers teaches a liquid cooling system for a neutron source assembly (title, abstract, col. 5-17; Figures 1 and 10-11), said cooling system comprising: a reservoir (inherently existing as otherwise conduit 90 could not deliver said liquid coolant (col. 8, l. 24-29) (see Figures 1 and 10)); a heat exchanger 132 or 226 in fluid connection with said reservoir of liquid coolant (col. 9, l. 23-35 and col. 13, l. 34). Eggers also teach a low Z target material (116 on 26) within the neutron source assembly 10 (col. 5, 63-68, col. 6, l. 13-58, col. 7, l. 5-20 and col. 8, l. 62-63). Eggers also teaches said liquid coolant to cool a non-bombarded surface of said low Z target (inside of 116, rather than outside, upper face of 116 that is bombarded).

Eggers does not necessarily teach said liquid gallium as liquid coolant. However, it would have been obvious to include the teaching of liquid gallium as coolant for an

Art Unit: 3663

irradiation target in view of Lidsky et al (col. 7, l. 10-20) being at least suitable as equivalent to water (loc.cit.). It has been held that the selection of a particular material known in the art to be suitable for its intended purpose would be entirely obvious. In re Leshin 125 USPQ 416. Eggers further teaches the liquid coolant 134 (col. 9, l. 28) to be provided to a non-bombarded surface (inside surface of 116 within 26 rather than the outside surface bombarded by the ion beam 22 (see Figures 1, 10).

Although neither Eggers nor Lidsky et al necessarily teach the further limitation that liquid gallium be provided "through a nozzle providing a concentrated flow through said nozzle, in a direction perpendicular to said non-bombarded surface" (of said low Z target material within said neutron source assembly), it would have been obvious to include said further limitation in view of Alger et al, who, in a patent on a cooling apparatus for an irradiation target (see title and abstract, and cols. 2-4), hence analogous art, teach to provide liquid coolant through, and by using, a nozzle 29 aimed in a direction normal to a non-bombarded surface (see Figures 1 and 2 in Alger et al) against the non-bombarded backside of the target 11 (again, see Figures 1 and 2), for the specifically stated purpose of increasing efficiency of cooling (col. 1, l. 19-23 and 44-66).

Although neither Eggers nor Lidsky necessarily teach the limitation "means for circulating said liquid gallium between said reservoir, said heat exchanger and the neutron source assembly" "in a direction normal to said non-bombarded surface of said low Z target material within (said) neutron assembly" it would have been obvious to include said limitation in view of Alger et al who, in a patent on cooling apparatus for an

Art Unit: 3663

irradiation target, hence analogous art, teach a pump 27 (col. 2, l. 16-47) for circulating said liquid coolant between said reservoir (in Alger et al, said reservoir is 23; see Figures 1 and 2 and col. 2, l. 23) of liquid coolant, said heat exchanger (in Alger et al said heat exchanger is 28; col. 2, l. 24-28) and the neutron source assembly (in Alger et al 13/15 (see col. 2, l. 16-2) in order to remove heat from an irradiation target 11 (col. 2, l. 16) more efficiently; it is known to those of ordinary skills in the art of cooling apparatus that a higher circulation of coolant enhances the cooling rate through heat convection. *Motivation* to include the teaching on pump 27 by Alger et al in the invention by Egger derives at least from the resulting increased cooling efficiency.

Motivation to include the teaching by Alger et al in the combined invention by Eggers and Lidsky et al on the above limitations on nozzle and means for circulating derives from the resultant increase in cooling efficiency as taught by Alger et al (loc.cit.).

Response to Arguments

Applicant's arguments filed 10/06/05 have been fully considered but they are not persuasive.

With regard to the comments on the previous objections to the Drawings and on the specification as amended: the specification does not remove all grounds for objection to the Drawings for the following reason:

In the description of Figure 1 an elongated element abutting 12 has no numeral, whole Figure 1 does not feature numeral 30 referred to in the description of Figure 1 per amended specification. Figure 2, on the other hand, does not feature numeral 12. The

Art Unit: 3663

drawings are thus seen to be incomplete and the amendment to the specification, rather than removing said grounds for objection to the Drawings, actually adds to the confusion by referring to both numerals 12 and 30 with regard to Figure 1 in one and the same sentence, while 12 and 30 are nowhere jointly shown.

Consequently, both Drawings and Specification are being objected to.

Furthermore, counter to applicant's argument in traverse of objection to the specification that Eggers (5,392,319) discloses support for the "outlet" 30: Eggers has been referred to in the original specification, but examiner does not find any statement on incorporation of Eggers by reference. Therefore, said argument is not persuasive.

All other arguments pertain to newly added limitations examined herewith for the first time. As witnessed from the rejections under 35 USC 103(a) said newly added limitations are obvious over Alger et al.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Johannes P. Mondt whose telephone number is 571-272-1919. The examiner can normally be reached on 8:00 - 18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack W. Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

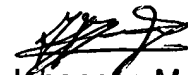
Art Unit: 3663

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JPM

April 21, 2006

Patent Examiner:

A handwritten signature in black ink, appearing to read 'J. Mondt', is written over the printed name.

Johannes Mondt (Art Unit: 3663).